



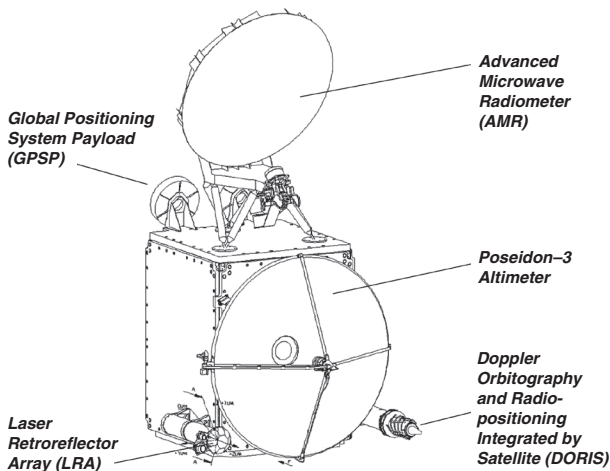
OSTM/Jason-2

Extending the Time Series — Ocean Data from Space

<http://sealevel.jpl.nasa.gov>



CNES/Mira Productions



The Ocean Surface Topography Mission (OSTM) is the next-generation ocean altimetry mission to extend the time series of sea surface topography measurements begun by TOPEX/Poseidon (1992–2005) and continued by Jason-1 (2001–). While the TOPEX/Poseidon and Jason-1 missions were collaborations between NASA and the French space agency CNES, OSTM is a four-partner mission with NASA, CNES, the European Organisation for the Exploitation of Meteorological Satellites (Eumetsat), and NOAA. The OSTM satellite (Jason-2), will carry the next generation instruments including CNES's Poseidon-3 dual-frequency radar altimeter to measure sea surface height and NASA/JPL's Advanced Microwave Radiometer (AMR) to remove the effects of water vapor from the altimetry measurement. With these and other technological improvements, OSTM will maintain or surpass Jason-1's measurement accuracy of 3.3 centimeters. This precise measurement will help scientists better understand ocean circulation and its effect on global climate. In combination with several other JPL-managed missions, including the Gravity Recovery and Climate Experiment, which measures Earth's mass distribution, QuikScat, which measures near-surface ocean winds, and Aquarius (to be launched in 2009) which measures ocean surface salinity, OSTM will make an important contribution to Earth system studies.

Science Objectives

- Extend the time series of ocean surface topography measurements beyond TOPEX/Poseidon and Jason-1 to complete two decades of high-precision altimetry observations
- Determine how ocean circulation varies over long time periods using the combined data record from TOPEX/Poseidon and Jason-1
- Improve the knowledge of the ocean circulation that does not change with time
- Measure global sea level change
- Improve coastal ocean tide models

Engineering Objectives

- Launch into the same orbit as Jason-1
- Maintain the same 3.3 centimeter measurement accuracy of Jason-1 with a goal of improving accuracy to 2.5 centimeters
- Maintain the stability of the global mean sea level measurement with long-term change in measurement accuracy less than one millimeter per year over the life of the mission
- Maintain the measurement accuracy of significant wave height to 50 centimeters or 10 percent of the wave height magnitude (whichever is greater)

Instruments and Primary Functions

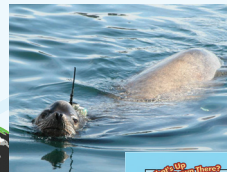
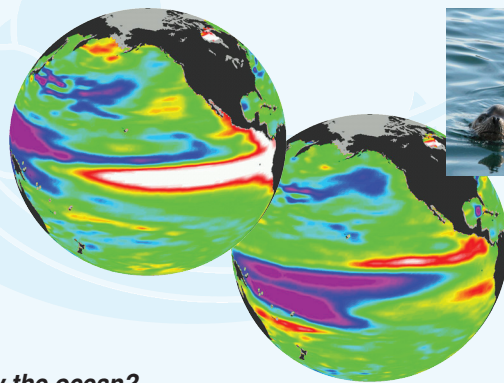
- Poseidon-3 Altimeter – Measures sea level (CNES)
- Advanced Microwave Radiometer (AMR) – Measures signal delay due to water vapor (NASA)
- Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS) – Determines precise orbit and tracks the satellite (CNES)
- Global Positioning System Payload (GPSP) – Provides precise orbit location data for satellite tracking (NASA)
- Laser Retroreflector Array (LRA) – Tracks the satellite and calibrates and validates the measurement system (NASA)

Three additional new instruments will also be onboard Jason-2 as “passengers.” Japan's Light Particle Telescope (LPT) and France's Environment Characterization and Modelisation-2 (Carmen-2) will study radiation in the satellite environment, and France's Time Transfer by Laser Link (T2L2) will use a laser link to make high-accuracy comparison and synchronization of remote ground clocks. In addition to the basic scientific interest, these instruments will allow for enhancements in data quality and accuracy for future ocean altimetry missions.

OSTM/Jason-2 Mission

Sea-level measurement accuracy	3.3 cm (1.3 in.)
Satellite to data user delay	3-hour data product within 1 hour of satellite download
Satellite mass	510 kg
Launch vehicle	Delta II
Satellite altitude	1336 km
Latitude of coverage	66 deg N to 66 deg S
Orbit type	Circular

Jason-2 will launch aboard a United Launch Alliance Delta II 7320 rocket from Vandenberg Air Force Base, California, in June 2008. After performing the initial satellite assessment/commissioning, CNES will handover spacecraft operations to NOAA and Eumetsat for the nominal mission operations phase. Data from the mission will be available to the international science community via the U.S. (NOAA) and European data centers (EUMETSAT, CNES).



Why do we study the ocean?

Our need to study the ocean comes from the pivotal role it plays in Earth's weather and climate. The ocean controls weather as it heats and cools, humidifies and dries the air, and affects wind speed and direction. Weather determines not only what we choose to wear to work but also whether the wheat crop in Kansas gets enough rain to mature, whether the snow pack in the Sierras is thick enough to supply water to southern California, whether the hurricane season in the Atlantic is mild or brutal, or whether an El Niño may destroy the eastern Pacific anchovy fishery. Long-term weather patterns influence water supply, food supply, trade shipments, and property values. Averaged over longer periods, weather patterns reveal climate, which in the long term can foster the growth of civilizations or be the cause of their demise. Over the past 50 years, the ocean has absorbed over 80 % of the heat from global warming. So if not for the ocean, global climate would be much warmer than it is today. Oceans cover 70% of our planet's surface and make it livable. By increasing our understanding of ocean dynamics, we are making that crucial step toward a clear understanding of its effects on weather and climate and their impact on us. We also study to learn how we affect the ocean and ways to protect and preserve this precious resource.

The importance of extending the data record

Ocean surface topography data from the TOPEX/Poseidon and Jason-1 missions have revolutionized our understanding of the ocean. Some of the important scientific results include:

- Confirmation and accurate measurements of global sea level rise
- Global- and decadal-scale observations and analyses of El Niño and La Niña
- New discoveries in ocean circulation and its effects on climate

- Determination of the seasonal and inter-annual variability of the global ocean, making the first reliable tests of ocean and climate model performance possible
- Improvements in ocean tide models
- New insights into ocean circulation and its interaction with turbulent ocean eddies provided by the three-year-long tandem mission, when TOPEX/Poseidon and Jason-1 flew together

OSTM will extend the length of the sea surface height measurement record to two decades, improving our understanding of long-timescale climate events such as the Pacific Decadal Oscillation (PDO). This two-phased pattern of climate variability can last from 10 to 70 years (<http://jisao.washington.edu/pdo/>) much longer than El Niño or La Niña events.

Societal benefits

Researchers and operational users incorporate ocean altimetry data into a variety of applications that benefit society. The data are used in climate research, ocean circulation studies, marine mammal research, and land applications; as well as operational oceanography including hurricane prediction, navigation, offshore operations, and fisheries. In addition, science results are used in both formal and informal education products and activities. The ocean surface topography education and public outreach team has joined with advocates across the country in developing programs and products to improve the public's understanding of the ocean and its critical role in Earth's climate.

For examples of the societal benefits of ocean altimetry data, see the NASA JPL Ocean Surface Topography from Space website (<http://sealevel.jpl.nasa.gov>) and the CNES Aviso website (<http://www.jason.oceanobs.com>).

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